

REMARKS

Claims 1-4, 8-34 are pending in the application. Claims 14-19 and 21-34 have been previously withdrawn without prejudice. Claims 5-7 have been previously cancelled. Claims 1-4, 8-13 and 20 are under consideration. Claims 1, 12 and 20 are currently amended.

Claims 1, 12 and 20 have been amended to delete the recitation that the soybean sample has not been infected by the soybean cyst nematode. No new matter has been introduced by these amendments.

I. Claim Rejections – 35 U.S.C. §112 First Paragraph.

Claims 1-4, 8-13 and 20 stand rejected under 35 U.S.C. §112 as failing to comply with the written description requirement. Applicant respectfully disagrees with the Examiner because the Specification did disclose obtaining NIR spectra on soybean samples without having been infected with SCN. For instance, after showing results from several experiments comparing NIR spectra obtained from soybean samples with or without SCN inoculation, the inventors concluded that “presence of SCN is not required to distinguish between SCN resistant and susceptible genotypes. Visual correlation analysis of spectra also confirm the lack of interaction between inoculation and spectra. This allows breeders to screen populations of experimental lines without having to inoculate them with SCN.” *See* paragraph 78 on page 20 of the Specification as originally filed. Thus, the recitation that the soybean samples “has not been infected by said soybean cyst nematode” has support in the original Specification in at least Paragraphs 68-78. However, in order to expedite the prosecution of the instant application, Applicant has amended Claims 1, 12 and 20 by deleting the recitation that the soybean samples “has not been infected by said soybean cyst nematode.”

Withdrawal of the new matter rejection is respectfully requested.

II. Claim Rejections – 35 U.S.C. §103 over Yuhara, in view of Schmitt, Rutherford and Hurburgh.

Claims 1, 2, 4, 8-13 and 20 stand rejected under 35 U.S.C. §103(a) as being obvious over Yuhara, Res. Bull. Hokkaido National Agriculture Experiment Station, 1975, No. 111, p91-100; Japanese translation document (“Yuhara” hereinafter), in view of Schmitt et al., Crop Science (1992) (“Schmitt” hereinafter), Rutherford, Journal of Chemical Ecology, 1998, Vol. 24, No. 9, p1447-63 (“Rutherford” hereinafter), and Hurburgh et al., WO 00/71993 (2000) (“Hurburgh” hereinafter). Applicant respectfully disagrees.

Obviousness is a question of law based on underlying factual inquiries. The factual inquiries (also known as the “Graham factual inquiries”) to be performed by the Examiner are as follows:

- (1) Determining the scope and content of the prior art;
- (2) Ascertaining the differences between the claimed invention and the prior art; and
- (3) Resolving the level of ordinary skill in the pertinent art.

Examination Guidelines for Determining Obviousness Under 35 U.S.C. 103 in View of the Supreme Court Decision in KSR International Co. v. Teleflex Inc., Federal Register, Vol. 72, No. 195, 57526-35, 57526 (October 10, 2007)(“Examination Guidelines” hereinafter). Once the Graham factual inquiries are resolved, the Examiner must determine whether the claimed invention would have been obvious to one of ordinary skill in the art. Although the prior art reference (or references when combined) need not teach or suggest all the claim limitations, the Examiner must explain why the difference(s) between the prior art and the claimed invention would have been obvious to one of ordinary skill in the art. *Id.* 57528.

The instant application discloses and claims methods for predicting whether or not a soybean plant derived from a soybean sample would be resistant or susceptible to soybean cyst nematode infection by using a spectrometer. Claims 1, 12 and 20 all recite the term “for predicting” and the step of “predicting” or “obtaining prediction.” The

plain meaning of the term “predict” is to declare or to indicate in advance, or to foretell on the basis of observation, experience, or scientific reason. Merriam-Webster Collegiate Dictionary (2000). The keyword here is “in advance.”

While the instant application teaches and claims methods or machine readable codes for telling in advance whether a plant would be resistant to SCN, none of the cited references alone or combined teach or suggest that the method can be used to foretell whether or not a given soybean sample is resistant to SCN infection. Yuhara teaches a method to detect, not predict infection by SCN. When a soybean sample (or plant) is infected with SCN and the infected sample (or plant) is observed by eye or camera to determine whether it is resistant to SCN infection, such a practice is more appropriately called detection, but not prediction. Although Hurburgh relates to telling apart genetically modified grain from non-genetically modified grain by using NIR spectra, Hurburgh never mentions SCN resistance. Schmitt relates to classification of different responses by soybean to different SCN races. Rutherford discloses a method for predicting sugarcane resistance to certain stalk borers. Taken together, substantial differences exist between the cited references and the instantly claimed invention because none of the cited references teach or suggest predicting whether a soybean sample would be resistant to SCN infection.

Applicant’s arguments presented above are not directed to features that are not recited in the instant claims because the feature of predicting is recited in all independent claims 1, 12 and 20. The rest of the claims all depend directly or indirectly from these independent claims and necessarily incorporate all limitations of the independent claims.

Under KSR and the Examination Guidelines, the Examiner is required to explain why the difference(s) between the prior art and the claimed invention would have been obvious to one of ordinary skill in the art. In other words, the Examiner must explain why using NIR spectra to predict SCN resistance genotypes would have been obvious to one of skill in the art at the time of the instant invention.

Yuhara teaches a method to detect existing plant injury caused by soybean nematode. *See e.g.*, page 91 of the original Yuhara reference, or lines 17-21 on page 2 of

the translated document provided by the Examiner. Yuhara teaches using infrared color films that form an image when exposed to infrared light. *See* lines 20-23 on page 3 of the translated document. Yuhara further teaches using different filters to capture multispectral images of the soybean crops at a distance, for example, from an airplane. *See* lines 1-11 on page 4 of the translated document. Yuhara fails to teach or suggest that infrared picture of soybean crops can be used to predict soybean resistance to SCN. To take pictures of a field of plants that have been infected by a pathogen and determine the severity of the infection is a process of assessing the damage, but not predicting whether the plants are resistant to the infection.

As explained above, the term “predict” requires that the determination be made in advance, not after the facts. Yuhara never teaches or suggests taking infrared picture of an uninfected soybean plant and determine whether such a plant would be resistant to SCN infection if it were inoculated with SCN. Yuhara never shows that SCN resistant soybean plants would look any different from SCN susceptible soybean plants on an infrared picture before the plants have been infected by SCN. Such a result would be required if the infrared photography of Yuhara were to be used to predict SCN susceptibility. On the contrary, the Yuhara methodology is based on the observation that soybean plants that have been infected by SCN appear different from soybean plants that have not been infected. Normally, such a difference can be readily discerned by an experienced farmer during a close-up examination of the plants. The Yuhara method is of value only in that it employed infrared photography to take aerial pictures of the entire field from high above and was able to tell which area of the field has been more severely infected by the pathogen. Taken together, the most important difference between Yuhara and Applicant’s methodology is that Yuhara’s methodology is only applicable after SCN infection has occurred and may be used in detecting SCN infection, whereas Applicant’s claimed invention is useful in predicting SCN susceptibility before any SCN infection has occurred. Put another way, the difference between Yuhara and the instant claims is analogous to one person looking at the sky saying that it is raining versus another person looking at the sky saying that it is going to rain next week.

Although Rutherford discloses a method for predicting sugarcane resistance to certain stalk borers, sugarcane is not soybean, and stalk borer is different from soybean nematode. Just because a method can be used to predict sugarcane resistance to certain stalk borers does not mean that the same method can be applied to predict soybean resistance to SCN. Rutherford never mentions or suggests that its method for predicting sugarcane resistance to stalk borer can be modified to predict soybean resistance to SCN.

Schmitt relates to classification of different responses by soybean to different SCN races but never mentions predicting whether a soybean plant derived from a specific soybean sample would be resistant to SCN. The system of Schmitt is at most a new system for notating (or recording) SCN resistance in soybean. Applicant does not see how such a system contribute directly to how one can predict whether a soybean plant would be resistant to SCN based on NIR scanning.

Although Hurburgh teaches methods for analyzing genetically modified samples and non-genetically modified samples by using NIR. Even if all the calibration parameters and reference parameters disclosed in Hurburgh are the same as those used in the instant claims, the instantly claimed invention would not have been obvious over Hurburgh alone or in combination with Yuhara, Rutherford and Schmitt. The gist of the instantly claimed invention is not in setting the calibration parameters and reference parameters and scan soybean samples under those settings. Rather, the most important feature of the instant invention is in the identification of a correlation between NIR spectra and SCN resistance genotypes. The present inventors achieved these feats by obtaining SCN resistance results through bioassays of different soybean samples. The inventors then compare these bioassay results against NIR spectra on the same samples using a number of statistical tools before arriving at the conclusion that NIR spectra can be used to predict SCN susceptibility in a soybean sample. Such a methodology would not work if no correlation existed between the NIR spectra and the SCN susceptibility. Although Hurburgh may have discovered a correlation between NIR spectra and genetic modification of a particular grain, Hurburgh never mentions or contemplates that a correlation between NIR spectra and SCN susceptibility exist in soybean samples.

Nor has the Examiner provided any evidence as to why the use of NIR spectra to predict soybean resistance to SCN would have been in the common knowledge available to one of skill in the art at the time of the present invention.

Thus, because the claimed invention is not obvious over Yuhara, in view of Rutherford, Schmitt or Hurburgh, withdrawal of the obviousness rejection is respectfully requested.

III. Claim Rejections – 35 U.S.C. §103 over Yuhara and in view of Schmitt, Rutherford, Hurburgh, Bewig and Borggaard.

Claims 3 and 9 stand rejected under 35 U.S.C. §103(a) as being obvious over Yuhara, in view of Schmitt, Rutherford, Hurburgh, Bewig et al., JAOCS (1994) (“Bewig” hereinafter), and Borggaard et al. (Anal. Chem. 1992, 64:545-51) (“Borggaard” hereinafter). Applicant respectfully disagrees.

Claims 3 and 9 both depend from Claim 1 directly or indirectly and necessarily incorporate all the limitations of Claim 1. As set forth above, the invention of Claim 1 is not obvious over Yuhara, in view of Schmitt, Rutherford, and Hurburgh because the recitation of predicting SCN resistance is not disclosed or suggested by any of the cited references and would not have been obvious to one of skill in the art at the time of the instant invention. Bewig relates to the use of soybean seed oil in a discriminate analysis, and Borggaard relates to the use of neural networks for interpreting NIR spectra for the purpose of classifying samples. Nothing in either Bewig or Borggaard is relevant to predicting soybean resistance to SCN. Therefore, Bewig and Borggaard do not cure the defect in the other references as explained in Section II. Because the inventions of claim 3 and claim 9 are not obvious over the cited references, withdrawal of the obviousness rejections is respectfully requested.

For the foregoing reasons, Applicant’s attorney respectfully solicits a Notice of Allowance in the next office communication. Applicant believes no additional fees are due at this time other than the fee for a one-month extension of time. However, if any

fees are deemed necessary in connection with this filing, the Commissioner is hereby authorized to charge deposit account No. 12-0600.

Respectfully submitted,

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A handwritten signature in dark ink, appearing to read 'Dan Cleveland, Jr.', is written over a horizontal line.

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